OUTLINE SHEET 3-1-1
Valves

A. Introduction

Day-to-day operations of equipment in the machinery spaces require the use of valves. The shipboard engineer is responsible for the maintenance and operation of these valves. This lesson will help you use and maintain these valves.

B. Enabling Objectives

3.8 **IDENTIFY** the component parts and function of basic types of valves.

3.9 **IDENTIFY** valves using the valve handwheel identification and color coding.

3.10 **STATE** the purpose of lagging pads and flange shields.

C. Topic Outline

1. Introduction
2. Overview
3. Globe Valve
4. Needle Valve
5. Gate Valve
6. Butterfly Valve
7. Ball Valve
8. Check Valves
9. Pressure Reducing Valve
10. Relief Valve
11. Manifold
12. Color Code
13. Flange Safety Shield
14. Summary and Review
15. Assignment

ASSIGNMENT SHEET 3-1-2
Valves

A. Introduction

This material is to be completed prior to the material being covered in class.

B. Enabling Objectives

Refer to enabling objectives in Outline Sheet 3-1-1.

C. Study Assignment

1. Read Fireman NAVEDTRA 12001, pages 9-13 to 9-24.
2. Read Information Sheet 3-1-3

D. Study Questions

1. Which valves are not suitable for throttling?
2. Which valves are considered quick-acting?
3. Which valve is suitable for making precise adjustments in flow or pressure?
4. What color is used to denote a valve that is used to start, stop or throttle the flow of:
   a. fuel oil
   b. lube oil
   c. low pressure (LP) air
   d. potable water
   e. steam

INFORMATION SHEET 3-1-3
Valves

A. Introduction

This information describes valves.

B. Reference

Fireman NAVEDTRA 12001
Machinist's Mate 3&2 NAVEDTRA 12144

C. Information

I. A valve is a device used to start, stop, or throttle the flow of fluids.
   A. Throttling means operating a valve partially open to regulate the pressure or flow of the fluid.
   B. Steel valves are used in temperatures above 550 degrees Fahrenheit and for high pressure applications.
   C. Brass and bronze valves are used in seawater systems where corrosion is a problem.

II. Globe valves are used for starting, stopping, and throttling the flow of fluids.
   A. Globe valves are the most common valves in the engineering plant.
   B. Named due to the globular shape of their bodies, but positive identification must be made internally.
   C. Parts of a globe valve include the following:
      1. Handwheel
      2. Stem
      3. Disk
      4. Seat
      5. Body
      6. Bonnet
      7. Union bonnet ring (or bonnet flange)
      8. Stuffing box
      9. Packing
      10. Packing nut (or packing gland stud and nut)
      11. packing gland

III. Needle valves are used to make relatively fine adjustments to flow.
   A. Needle valves are often considered a form of the globe valve.
   B. The disk is tapered to a point like a needle.
   C. The shape of the needle/disk and the seat allow for only a small amount of fluid through the valve.

IV. Gate valves are used when a straight line flow of fluid and minimum restriction is desired.
  A. Gate valves use a wedge shaped gate to start or stop the flow of fluid.
  B. Gate valves are not suitable for throttling.
    1. The control of flow is difficult due to the valve design.
    2. The flow of fluid slapping against a partially open gate can cause extensive damage to the valve.
  C. The parts of the gate valve include:
    1. Handwheel
    2. Stem
    3. Body
    4. Seats
    5. Gate
    6. Bonnet
    7. Stuffing box
    8. Packing
    9. Packing gland
  D. Gate valves may be either rising stem or non rising stem.
    1. Nonrising stem gate valve - the stem is threaded into the gate. As the handwheel on the stem is rotated, the gate travels up or down the stem on the threads while the stem remains vertically stationary.
    2. Rising stem gate valve - the gate is attached to the stem. The gate and stem rise and lower together as the valve is operated.

V. Butterfly valves provide positive shut off and throttling ability.
  A. Parts of a butterfly valve include:
    1. Handle - Most butterfly valves are quick acting. It can be operated fully open to fully closed by turning the handle 90 degrees or 1/4 of a turn.
    2. Stem
    3. Disk
    4. Seat
    5. Body
    6. Notched throttling plate
    7. Locking trigger

VI. Ball valves start and stop the flow of fluid. They are not suitable for throttling.
  A. Ball valves are quick acting valves.
  B. The ball performs the same function as a disk in a globe valve.
  C. When the ball is rotated to a point where the hole through the ball is in line with the pipe, the valve is open.

D. Parts of a ball valve include:
   1. Handwheel/lever
   2. Stem
   3. Ball
   4. Seats
   5. Body

VII. Check valves allow fluid to flow in one direction only.
   A. Check valves are operated automatically by the fluid in the system.
   B. The major types of check valves are swing, lift, ball, and stop check type..
   C. The major parts of a swing check valve are:
      1. Body
      2. Disk
      3. Seat
      4. Cap
      5. Hinge pin
   D. The disk of the swing check valves rises as the pressure in the line below the disk is sufficient to lift the disk off the seat.
      1. If for any reason the flow is reversed, or if back pressure builds up, this opposing pressure forces the disk against the seat, which in turn stops the flow.

VIII. Pressure-reducing valves are automatic valves that provide a steady pressure into a system that is at a lower pressure than the supply pressure.

IX. Relief valves are used on system lines and equipment to prevent overpressurization. Relief valves open at a preset pressure and shut when the pressure drops slightly below the lifting pressure.

X. Valve manifolds are used where a suction must be taken from one or more sources and discharged to one or more locations. Manifolds centralize the location of these valves.

XI. The system the valve is in may be identified by the Valve Handwheel Color Code.
   A. Color coding provides easy and quick identification during operation, training, and casualty control conditions.
   B. All ships and shore based training facilities must conform to this color code.

XII. Individual valves may be identified by markings on the handwheel by valve labels.
   A. Since the valves for the piping systems are associated with propulsion plant systems, identifying these valves is accomplished using a three-part designation in the following sequence:
      1. shaft or plant number
      2. system designation letters
      3. Individual valve number
         Example: 2MS-3

XIII. Flange safety shields are designed to reduce the possibility of an oil fire spray fire.

A. Flange safety shields are usually made of aluminized cloth and are wrapped and wired around the flange.

B. Flange safety shields will not stop leaks but will only prevent spraying when leaks occur.

II. A lagging pad is removable insulation.

A. Removable insulation is installed at the following areas:

1. On flanged pipe joints adjacent to machinery or equipment that must be disconnected when units are opened for inspection or overhaul.

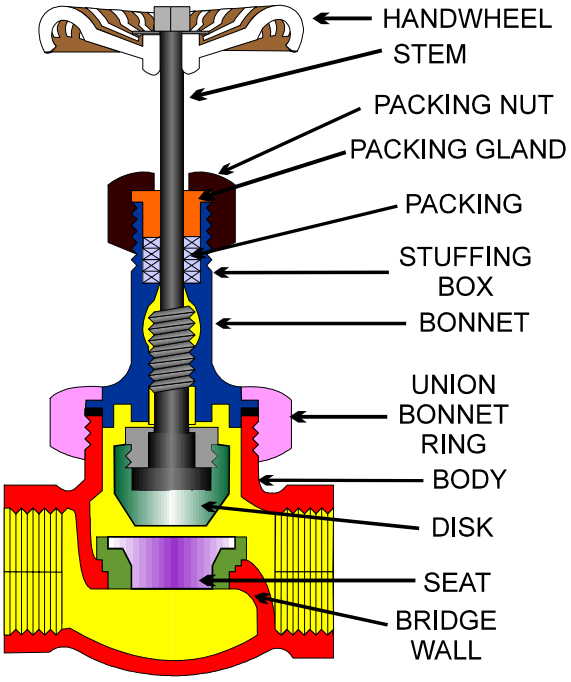
2. Bonnets of valves larger than 2 inches internal pipe size (ISP) that operate at 300 psi and above or at 240 degrees Fahrenheit and above.

B. Flanges are insulated with easily removable forms. These forms are made up as pads of insulating material wired or bound in place.

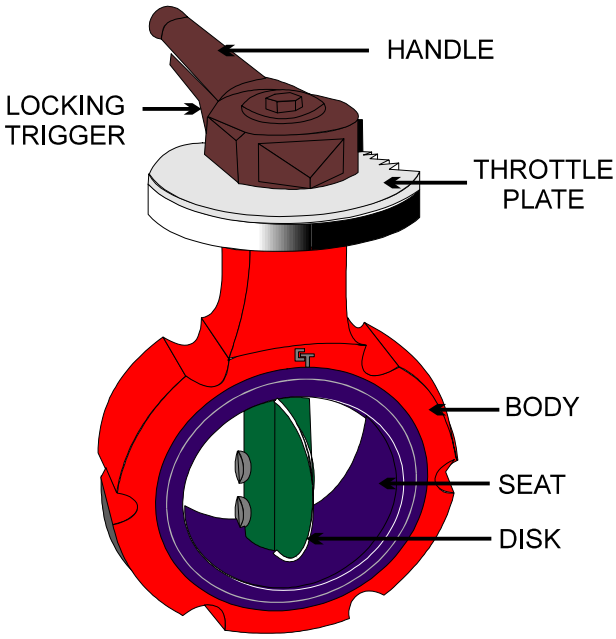
DIAGRAM SHEET 3-1-4A
Valve Handwheel Color Code

FLUID	VALVE HANDWHEEL AND OPERATING LEVER
Steam	White
Potable Water	Dark Blue
Nitrogen	Light Gray
High Pressure (HP) Air	Dark Gray
Low Pressure (LP) Air	Tan
Oxygen	Light Green
Salt Water	Dark Green
JP-5	Purple
Fuel Oil	Yellow
Lube Oil	Striped Yellow/Black
Fire Plugs	Red
Foam Discharge	Striped Red/Green
Gasoline	Yellow
Feedwater	Light Blue
Hydraulic	Orange
Hydrogen	Chartreuse
Helium	Buff
Helium/Oxygen	Striped Buff/Green
Sewage	Gold

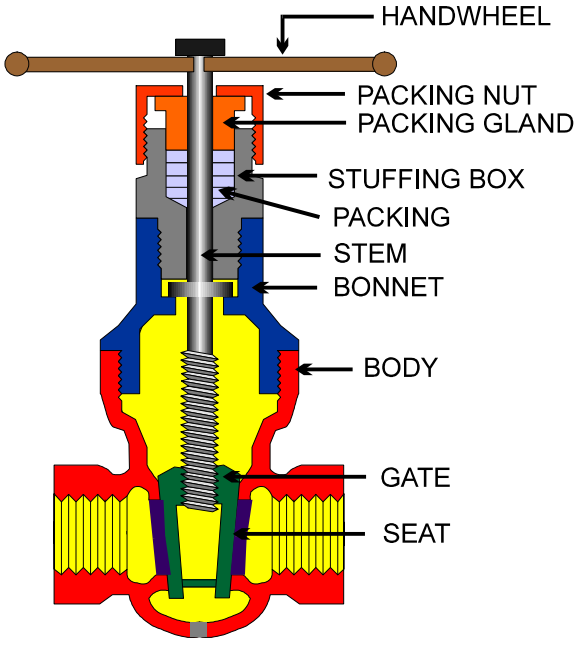
DIAGRAM SHEET 3-1-4B
Stop Valves



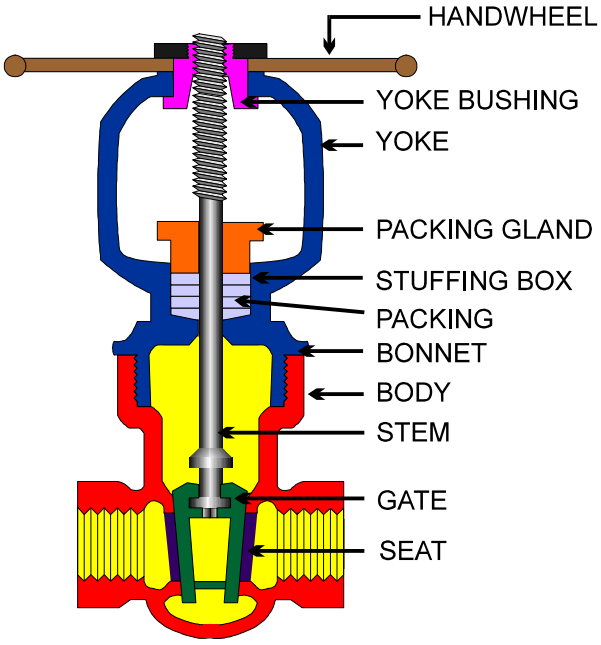
GLOBE VALVE



BUTTERFLY VALVE

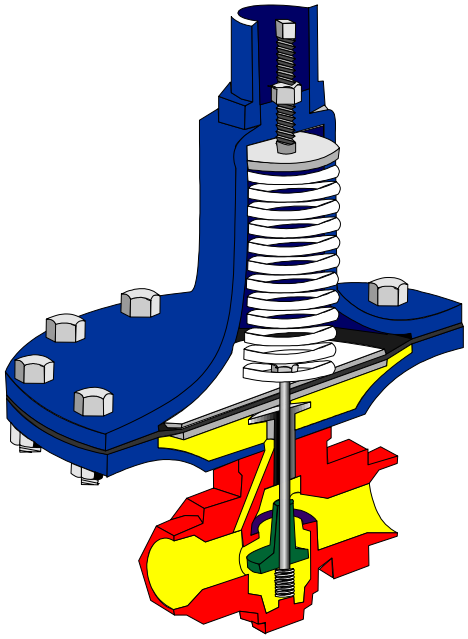


NON-RISING STEM GATE VALVE

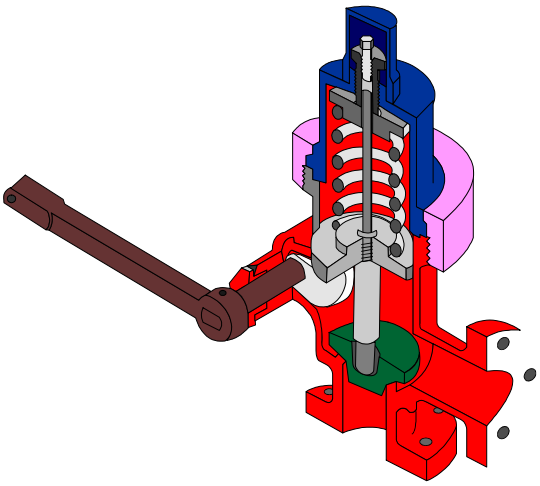


RISING STEM GATE VALVE

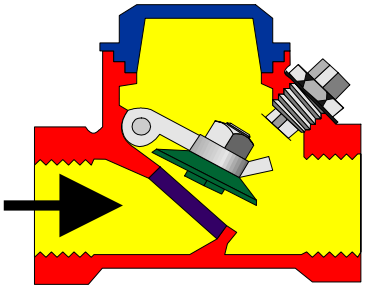
DIAGRAM SHEET 3-1-4C
Miscellaneous Valves



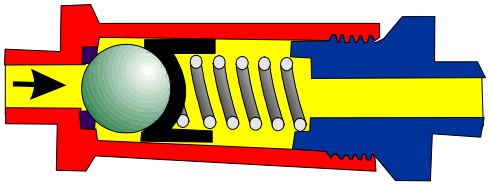
Pressure-Reducing



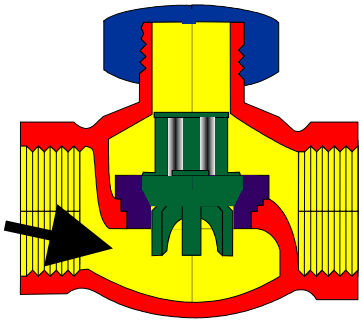
Relief Valve



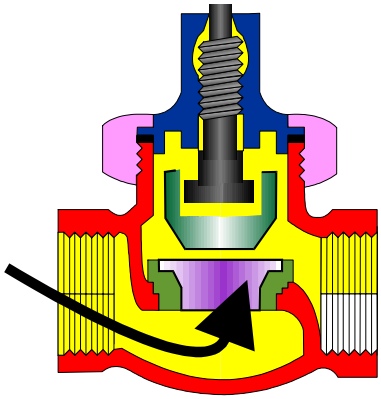
Swing Check Valve



Ball Check Valve



Lift Check Valve



Stop-Check Valve